Roll No. | | | | | | | | | | | | |

Total No. of Pages : 01

Total No. of Questions : 08

M.Tech.(ME) (Sem.–1)

ADVANCE MACHINE DESIGN

Subject Code : MME-505

Paper ID : [E0405]

Time : 3 Hrs. Max. Marks : 100

INSTRUCTION TO CANDIDATES :

1. Attempt any FIVE questions out of EIGHT questions.
2. Each question carries TWENTY marks.

Q1. Write short note on theories for elastic failure of machine parts. Compare them and explain the use and selection criteria of different theories of failures.

Q2. A transmission shaft of cold drawn steel 27 Mn2 (S_{ut} = 500 N/mm^2 and S_{yt} = 300 N/mm^2) is subjected to a fluctuating torque which varies from –100 N-m to + 400 N-m. The factor of safety is 2 and the expected reliability is 90%. Neglecting the effect of stress concentration, determine the diameter of the shaft. Assume the distortion energy theory of failure.

Q3. Explain the mechanism of Hertzian contact stresses in cylindrical surfaces. Find the range of magnitude of Hertzian stresses in both cylindrical and spherical surfaces.

Q4. What is limit design? Explain various factors affecting the limit design of power transmission components.

Q5. What is creep? Explain the effect of temperature and stress on creep. Describe the creep mechanism occurred in a ductile material under tensile loading.

Q6. A round plain carbon steel 25C8 rod having the yield strength of 280 N/mm^2 and a standard deviation of 40 N/mm^2 is subjected to a bending stress of 180N/mm^2 and a standard deviation of 20N/mm^2. Determine the reliability of beam, the average factor of safety and minimum available factor of safety.

Q7. Describe the steps involved in finite element analysis. How an interpolation function affects the outcome of solution?

Q8. Write short notes on :

a) Fracture mechanism.

b) Design for reliability.

c) Computer Aided Machine Design.

d) Designing against creep.